Prevalence and Treatment of Tapeworms in Horses

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SUMMARY

A study was initiated to determine the prevalence of tapeworms in horses in Southern Ontario and to investigate the efficacy of pyrantel pamoate, niclosamide and mebendazole. Fecal samples were taken from 580 horses of various breeds, ages and sexes in 24 locations and *Anoplocephala perfoliata* was found in 13.6%. This was regarded as a minimum, the true rate being probably significantly higher and the reasons for this are discussed. A brief review of the life cycle and effects of tapeworms in horses and a comparison of two flotation techniques for the diagnosis of *A. perfoliata* eggs in feces is given.

Pyrantel pamoate, niclosamide and mebendazole were compared for efficacy in field and critical trials. In field trials, pyrantel base and niclosamide at 6.6 and 50 mg/kg respectively were found to be effective, but in critical trials their efficacy was poor, 15 and 5.6% respectively. These anthelmintics at these dose rates caused only an elimination of the terminal egg bearing segments and were without significant effect on the entire tapeworm. When pyrantel base was administered at 13.2 and 19.8 mg/kg (twice and three times the therapeutic dose rate for nematodes respectively) the efficacy was 97.8 and 100%. It would appear that pyrantel pamoate administered at 13.2 mg pyrantel base/kg is an effective therapeutic dose for tapeworms in horses. Further dose titration studies are needed for niclosamide. Mebendazole was without effect at up to four (35.2 mg/kg) times the therapeutic dose for nematodes.

RÉSUMÉ

Prédominance et traitement des ténias chez le cheval

Cette étude visait à déterminer l'incidence des ténias chez les chevaux du sud de l'Ontario et à préciser l'efficacité du pamoate de pyrantel, du niclosamide et du mébendazole. On préleva des fèces chez 580 chevaux, répartis sur 24 fermes et différents par l'âge, la race et le sexe; 13.6% de ces animaux hébergaient *Anoplocephala perfoliata*. On considéra ce résultat comme minimal; le taux réel d'infection est probablement un peu plus élevé, comme le précisent les commentaires à ce sujet. On présente une brève revue du cycle vital et des effets des ténias chez le cheval, ainsi qu'une comparaison de deux techniques de flottation fécale pour l'identification des oeufs de *A. perfoliata*.

Des essais sur des fermes et d'autres, plus critiques, servirent à comparer l'efficacité des trois anthelminthiques expérimentaux. Les essais sur les fermes révélèrent que des doses de 6.6 mg/kg de base de pyrantel et de 50 mg/kg de niclosamide donnaient de bons résultats; au cours d'essais plus critiques, l'efficacité des mêmes doses de ces deux médicaments s'avéra moins bonne et n'atteignit respectivement que 15 et 5.6%. L'utilisation de telles doses de ces deux anthelminthiques ne provoqua que l'élimination des segments terminaux et porteurs d'oeufs des ténias; elle ne produisit aucun effet appréciable sur les ténias eux-mêmes. L'administration de base de pyrantel, à raison de 13.2 et 19.8 mg/kg, c'est-à-dire deux et trois fois la dose thérapeutique pour les nématodes, se traduisit par une efficacité de 97.8 et 100%. Il semble qu'une dose de 13.2 mg/kg de cet anthelminthique représente une dose thérapeutique efficace à l'endroit des ténias du cheval. Des études supplémentaires s'imposent pour déterminer les doses thérapeutiques du niclosamide. L'utilisation du mébendazole, à raison de 35.2 mg/kg, i.e. quatre fois la dose thérapeutique pour les nématodes, s'avéra inefficace.

INTRODUCTION

Information on the prevalence, effects and treatment of tapeworms in horses is limited (1, 2, 3, 5, 6, 7, 8, 9, 10, 11). Generally, tapeworms in horses are widespread in distribution, but the prevalence is not considered to be high and only occasionally are they regarded as clinically significant. In North America three tapeworms have been described for horses, *Anoplocephala perfoliata, A. magna* and *Paranoplocephala mamilliana* (7). *Anoplocephala perfoliata* is considered to be the commonest species worldwide. In North America, it was previously considered uncommon and *A. magna* was regarded as the most frequent (11). The two species are now considered equally prevalent (7). In Canada, both species have been found (10), but there has been no real attempt to investigate prevalence. The intent of this study was to gather information on prevalence in Ontario and to investigate in a preliminary way the efficacy of three anthelmintics.

MATERIALS AND METHODS

Horses were used in several locations in Southern Ontario and were of various breeds, ages and

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sexes. Fecal samples were analysed for tapeworm ova using a centrifugal flotation procedure (4). The study for prevalence involved an analysis of fecal samples from numerous horses. The efficacy of anthelmintics was investigated in both field and critical studies using horses naturally infected with *A. perfoliata*. Three anthelmintics were used: pyrantel pamoate (Strongid-T®),[1] mebendazole (Telmin®)[2] and niclosamide (Yomesan®)[3] and all were administered via stomach tube. Niclosamide was in the form of 500 mg tablets and these were crushed and mixed with water prior to administration.

In the field trial, body weights of the infected horses were estimated and one of the three anthelmintics was administered. Pyrantel pamoate was given at the rate of 6.6 mg pyrantel base/kg, mebendazole at 17.6 mg/kg and niclosamide at 50 mg/kg. Some infected horses were untreated. Fecal samples were taken from all horses at the time of treatment and up to three weeks post-treatment (PT).

In the critical trial, horses naturally infected with tapeworms were placed in a stall in which all fecal material passed could be collected. Three to seven days after stabling the horse was weighed and treated with an anthelmintic. Pyrantel pamoate was given at either 6.6, 13.2 or 19.8 mg pyrantel base/kg, mebendazole at either 17.6 or 35.2 mg/kg and niclosamide at 50 mg/kg. For 12 hours prior to treatment, feed was withheld, from one horse which received mebendazole at 17.6 and another at 35.2 mg/kg. Feces was collected for 96 hours pre-treatment from the one horse receiving 13.2 mg/kg of pyrantel base. Feces was collected for 96 hours PT from all horses. The feces was washed on a standard sieve (aperture opening 0.25 mm — Mesh No. 60) and the washed material was carefully searched for tapeworns. At 72 hours PT feed was withheld from all horses. At postmortem, which was at 96 hours PT, the ileum and large intestine were removed, separated, opened and the contents evacuated. The mucosa was examined for tapeworms and the contents were processed by sieving and examined as described earlier.

RESULTS

In the study for prevalence, fecal samples were taken from 580 horses in 25 locations (Table I). Only *A. perfoliata* was identified and was found in 79 horses. In the field trial for efficacy, 40 horses in 10 locations were used (Table II): 12 horses received pyrantel pamoate, ten niclosamide, six mebendazole and 12 were untreated. Pyrantel pamoate and niclosamide caused a reduction of tapeworm ova in the feces. Mebendazole was ineffective. In the critical trial seven horses were used (Table III). When pyrantel pamoate was administered at 6.6, 13.2 or 19.8 mg pyrantel base/kg it eliminated 15, 97.8 and 100% of the tapeworms respectively; niclosamide eliminated 5.6% and mebendazole was ineffective. No tapeworms or segments were found in the feces collected pre-treatment from one horse. The majority of the tapeworms and segments eliminated were recovered in feces collected in the second 24 hours PT. The majority of the tapeworms found in the horses at postmorten were attached to the mucosa in the area of the ileocecal junction.

DISCUSSION

Anoplocephala perfoliata was found in 13.6% of horses examined in southern Ontario and this is probably higher than previously considered (10). Even so this must be regarded as a minimum and the true rate is probably significantly higher. Generally, few *A. perfoliata* eggs are found in feces and they levitate poorly in flotation solutions. The eggs are found primarily in gravid segments from which they are liberated after the segments have been passed with the feces.

The number of horses found with tapeworm ova may have been significantly lower had a gravita-

TABLE I
THE PREVALENCE OF *ANOPLOCEPHALA PERFOLIATA* IN HORSES AS DETERMINED BY FECAL ANALYSIS, IN SEVERAL LOCATIONS IN SOUTHERN ONTARIO

Location	No. Examined	No. with *A. perfoliata*
1	7	2
2	2	0
3	52	9
4	40	5
5	17	5
6	57	8
7	50	11
8	10	0
9	27	0
10	24	3
11	22	0
12	15	0
13	2	0
14	9	2
15	14	0
16	26	0
17	51	11
18	11	0
19	3	1
20	76	10
21	41	4
22	7	0
23	7	3
24	5	0
25	5	5
Total	580	79

[1]Rogar/STB, Division of BTI Products Inc., London, Ontario.
[2]Pitman-Moore Ltd., Scarborough, Ontario.
[3]Haver-Lockhart Laboratories, Division of Bayvet Corp., Mississauga, Ontario.

TABLE II

EFFICACY OF THREE ANTHELMINTICS AGAINST *ANOPLOCEPHALA PERFOLIATA* IN HORSES IN A FIELD TRIAL. THE DOSE RATES IN MG/KG OF THE ANTHELMINTICS WERE AS FOLLOWS: PYRANTEL BASE 6.6, MEBENDAZOLE 17.6 AND NICLOSAMIDE 50. SOME HORSES WERE NOT GIVEN AN ANTHELMINTIC

Location	Horse	Anthelmintic	*A. perfoliata* Ova Identified in Feces on Posttreatment Day				
			0	5	7	14	21
1	1	Pyrantel pamoate	+[a]	–[b]	–	–	–
	2	Mebendazole	+			+	+
2	1	Pyrantel pamoate	+	–	–	–	–
	2	Mebendazole	+			+	+
3	1	Pyrantel pamoate	+		–	–	–
	2	Mebendazole	+		+	+	+
	3	Mebendazole	+		+	+	+
	4	None	+		+	+	
	5	None	+		+		
4	1	Pyrantel pamoate	+		–	–	–
	2	Mebendazole	+		+	+	+
	3	Mebendazole	+		+	+	+
	4	None	+		+	+	
	5	None	+		+	+	
5	1	Pyrantel pamoate	+	–	–	–	–
	2	Pyrantel pamoate	+		–	–	–
	3	None	+		+	+	+
6	1	Niclosamide	+	–	–	–	–
7	1	Pyrantel pamoate	+	+	+	–	–
	2	Pyrantel pamoate	+	–	–	–	–
	3	Pyrantel pamoate	+	–	–	–	–
	4	Niclosamide	+	–		–	–
	5	Niclosamide	+	–		–	–
	6	None	+	+	+	+	+
	7	None	+	–	–	–	–
	8	None	+	+	+	+	+
8	1	Pyrantel pamoate	+	–	–	–	–
	2	Pyrantel pamoate	+	+	–	–	–
	3	Pyrantel pamoate	+	–	–	–	–
	4	Niclosamide	+	–	–	–	–
	5	Niclosamide	+	–	+	+	+
	6	Niclosamide	+	–	–	–	–
	7	None	+	–	+	–	–
	8	None	+	+		+	+
9	1	Niclosamide	+	–	–	–	–
	2	Niclosamide	+	–	–	–	–
	3	None	+	+	+	+	+
10	1	Niclosamide	+	–	–	–	–
	2	Niclosamide	+	–	–	+	–
	3	None	+	+	+	+	+

[a] + Fecal analysis positive

[b] – Fecal analysis negative

tional flotation technique been used. In a small trial prior to this study, the more routinely used standard vial flotation technique (10), which utilizes gravitational force, was compared with the centrifugal flotation procedure (4). Samples from ten horses, randomly selected from a farm known to have a tapeworm infection, were analysed by both techniques. Four horses were found positive using the centrifugal flotation procedure and only one with gravitational flotation. It appeared, therefore, that detection of *A. perfoliata* by fecal analysis was more likely using the centrifugal flotation procedure.

Anoplocephala perfoliata, creamy white and up to 86 cm long and 14 mm wide, is found attached to the mucosa in both the small and large intestine in the area of the ileocecal valve. Its significance as a pathogen is questioned. Inflammation and ulceration of the mucosa can be produced at the point of attachment (1) and these may become

TABLE III

EFFICACY OF THREE ANTHELMINTICS AGAINST *ANOPLOCEPHALA PERFOLIATA* IN HORSES IN CRITICAL TRIALS

Anthelmintic	Dosage mg/kg	Horse No.	No. of *A. perfoliata* Recovered Posttreatment				
			In Feces in Successive 24 Hour Periods				In Horse at Necropsy at 96 Hours
			1st	2nd	3rd	4th	
Mebendazole	17.6	1[a]	0	0	0	0	74 worms
		2	0	0	0	0	316 worms
	35.2	1[a]	0	0	0	0	28 worms
Niclosamide	50	1	1 worm 1 seg	4 seg[b]	3 seg	0	17 worms
Pyrantel Base	6.6	1	4 worms 4 seg	9 worms 10 seg	3 seg	0	58 worms
	13.2	1[c]	0	129 worms 486 seg	5 worms 5 seg	0 0	3 worms 0
	19.8	1	1 worm 32 seg	19 worms 12 seg	5 worms 7 seg	0	0

[a]Starved for 24 hours pretreatment

[b]Seg = segments

[c]Feces collected for 96 hours pretreatment. One worm and three segments were recovered and were found in the first 24 hours of collection.

secondarily infected and enlarged with abscessation (5) or perforation (8). In heavy infections, there may be acute enteritis or excessive hyperplasia producing a mass which can occlude the ileocecal valve to induce recurrent colic and death (11). Free living mites, which ingest the eggs, are the intermediate hosts and a horse becomes infected on ingestion of the infected mite with herbage. Infections are associated usually with older pastures where a good mat facilitates the development of the mite.

The treatment of horses with tapeworms has not been investigated extensively. In the field trial in this study, it appeared that 6.6 mg/kg of pyrantel base or 50 mg/kg of niclosamide was effective against *A. perfoliata*. In the critical trial such doses were found to have poor efficacy. Following treatment there were numerous segments passed in the feces, but pyrantel pamoate and niclosamide removed only 15 and 5.6% of the tapeworms respectively. When pyrantel pamoate was used in critical trials at double and triple (13.2 and 19.8 mg pyrantel base/kg) the therapeutic dose for nematodes the efficacy was markedly increased, 97.8% and 100% respectively. When the results for the field and critical trials are compared, it is obvious that the negative results found in the field trial occurred because the anthelmintics eliminated the terminal egg bearing segments and did not affect the scolices. When the dose rate for pyrantel pamoate was increased as was in the critical trial, there was significant effect on the entire tapeworm. It would appear that pyrantel pamoate administered at 13.2 mg pyrantel base/kg is an effective therapeutic dose for tapeworms in horses. Further dose titration studies are necessary to determine a rate at which niclosamide would be effective against the complete tapeworm. Safaer (9) reported close to 100% efficacy using niclosamide at 200-300 mg/kg but these were also in field trials. A claim for high efficacy for mebendazole (6) could not be confirmed in these trials; dose rates of up to four times the therapeutic dose for nematodes were without effect on tapeworms. Other anthelmintics reported useful against tapeworms are fenbendazole (2), bithionol (7 mg/kg), bithionol acetate (10 mg/kg) and dichlorophen (25 mg/kg) (3), but these were all in field trials.

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LETTERS TO THE EDITOR

Handyman's Suction Apparatus

DEAR SIR:

There are many indications for suction in veterinary surgery. Due to relatively high cost of equipment and low usage many of us are reluctant to make the investment.

In our practice we originally purchased a used suction unit that worked well but broke down after a couple of years. We have also tried a unit which hooked onto the tap but it was cumbersome and gave poor results.

A promotion from an oil company advertised a small compressor suction unit for less than $40. It operates on the 12 volt cigarette lighter (useful for large animal field surgery) and can be converted with a small transformer to work on 110 volt A.C. available for about $15. This inexpensive, compact and quiet unit is available from most hardware and automotive shops. Suction bottles can be purchased from surgical supply houses or can be fashioned from any suitable bottle. A variety of sterile disposable tips makes this a very useful surgical tool.

Yours truly,

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ABSTRACT

Treating prairie cattle for worms: Is it a waste of money/ L. Polley and P. Stockdale (Dept. Vet. Micro., West. Coll. Vet. Med., Saskatoon, Saskatchewan).

Two field experiments were carried out during 1977 to investigate the effects of anthelmintic treatment on selected production parameters of beef cattle in Alberta and Saskatchewan. In the experiments, the performance of treated animals was compared with that of untreated controls.

In the first experiment, two hundred steers were divided into four groups of 50 animals each. Three groups were each treated with a different anthelmintic and the fourth group was treated with a placebo. There was no significant difference between treated and untreated groups of cattle for either daily rate of weight gain or efficiency of feed conversion over a period of 90 days. Examination of the faeces for helminth eggs demonstrated that all the anthelmintics removed adult nematodes very effectively.

In the second experiment approximately six hundred cows on seven ranches were divided into treated and untreated groups. The treated group was dewormed three times, at parturition, in June and in August, and the calves from these cows were dewormed twice, in June and August. Treated and untreated cattle were pastured together throughout the grazing season (May-October). There was no statistically significant differences in rates of gain between the groups of calves during an R.O.P. (Record of Performance) adjusted 205 day grazing period. The faecal nematode egg counts of the calves gradually increased during the summer to reach a maximum in the fall. The mean faecal egg counts of the treated cows and calves were consistently lower than those of the untreated animals.

Under the circumstances of these experiments in which cattle at pasture and in feedlots were treated with anthelmintics we found that although the anthelmintics were effective in removing worm parasites from the cattle no benefits in terms of increased gains of weight or in increased efficiency of feed conversion occurred.

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